Feb. 11, 1936. 2,030,132

V. G. APPLE

MOLD FOR MAKING COMMUTATORS

Original Filed May 16, 1929

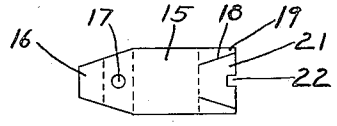


Fig. 1.

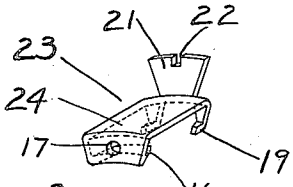


Fig. 2

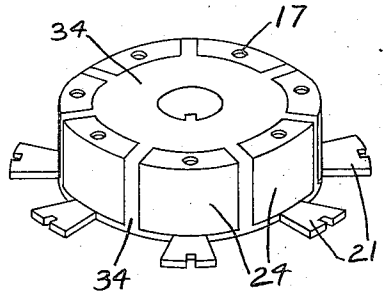


Fig. 7

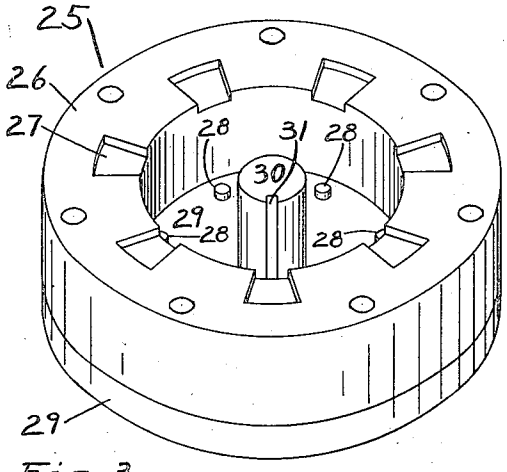


Fig. 3.

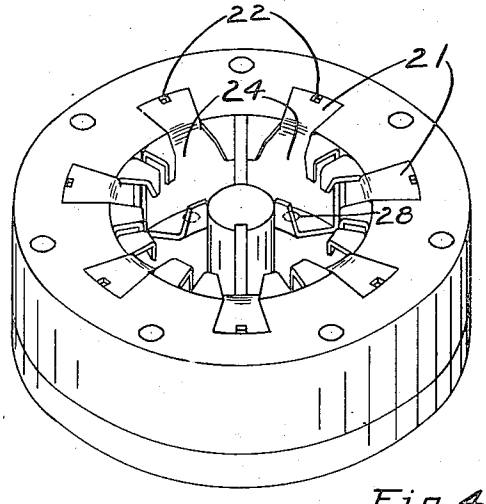


Fig. 4

Fig. 5

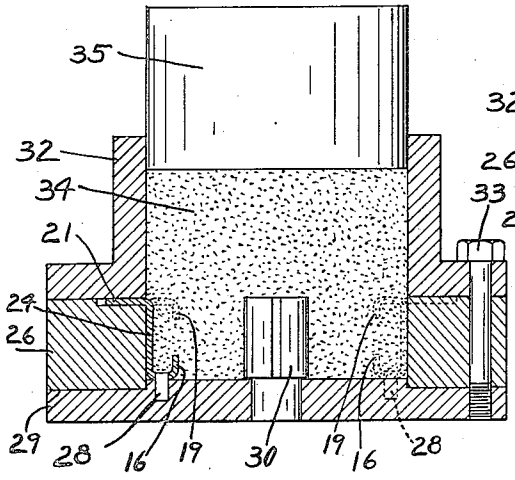
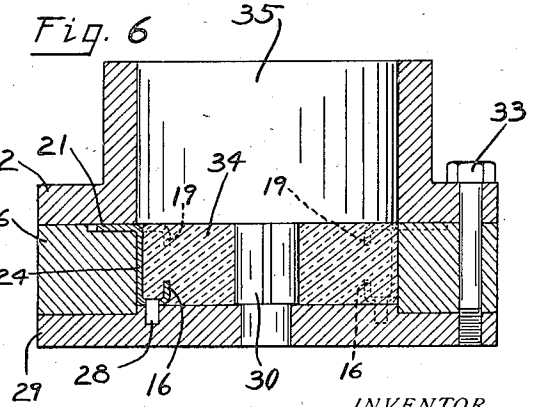


Fig. 6



INVENTOR
Vincent G. Apple Decd
by Herbert F. Apple, Edward M. Apple, Gourley Darroch } Executors
by Frederick W Cottenman, Atty.

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2,030,132

MOLD FOR MAKING COMMUTATORS

Vincent G. Apple, deceased, late of Dayton, Ohio, by Herbert F. Apple, Edward M. Apple, and Gourley Darroch, executors, Dayton, Ohio

Original application May 16, 1929, Serial No. 363,460. Divided and this application January 26, 1933, Serial No. 653,729

3 Claims. (Cl. 18—42)

This invention is a division of copending application Serial No. 363,460, filed May 16th, 1929, and relates to apparatus for making commutators of the class comprising a cylindrical row of spaced apart segments of conductive material imbedded in a core of molded insulation.

The object of the invention is to provide a mold which will greatly facilitate the making of a commutator of this character.

This object is obtained in the structure hereinafter described and illustrated in the accompanying drawing, wherein,

Fig. 1 shows a sheet metal blank such as may be used for making commutator segments.

Fig. 2 shows the blank Fig. 1 after it is bent to compose a segment.

Fig. 3 shows the body of the mold within which a cylindrical row of the segments are held while the core of insulation is molded within and between them.

Fig. 4 shows a set of the segments within the mold body as they appear therein before the core of insulation is molded.

Fig. 5 is a vertical axial section through the complete mold having the cylindrical row of segments spaced and held therein and a quantity of loose unmolded insulation sufficient for the core within the mold ready to be pressed within and between the segments.

Fig. 6 shows the mold Fig. 5 after it has been operated to force the insulation core into permanent position.

Fig. 7 shows the completed commutator after it is removed from the mold.

Similar numerals refer to similar parts throughout the several views.

Referring now to the drawing, a segment blank 15 is cut from sheet metal, preferably copper, one end 16 being tapered and having a hole 17 therethrough while the other end is slitted on the lines 18 whereby it is divided into two outer parts 19 and a keystone shaped middle part 21 with a notch 22 at the extreme end.

To make a commutator segment 23 of the blank 15 it is bent as in Fig. 2 where the body 24 of the blank, which is to form the brush track, is curved to the radius of the commutator cylinder, the parts 16 and 19 are bent downward and toward each other to form anchors which will be imbedded in the commutator core, and the keystone shaped part 21 is bent upwardly to form a riser for the segment, the notch 22 being provided for making the winding connection.

Fig. 3 shows the body 26 of the mold 25 which is provided for locating and holding the segments 23 in accurately spaced apart cylindrical formation while molding the core of insulation between them. In the top surface of the body 26 are a series of keystone shaped pockets 27 within which the risers 21 may be seated. Pins 28 in the base 29 of the mold are preferably provided to enter holes 17 in the lower end of the segments.

The pins 28 are provided to keep the lower ends of the segments from moving toward or away from each other, but they are of advantage only when the segments are relatively long and narrow, for in such a case the holding of the segments at the one end by the riser may not effectively prevent the other end from moving about. But where the segments are relatively short and wide the pins 28 are preferably omitted, for in that case the segments may be held sufficiently by the risers themselves.

A center plug 30 having a keyway 31 is concentrically supported in the body 26 on the base 29 and is adapted to form the central axial opening through the commutator with an integral key of molded insulation extending inwardly from the wall of the opening.

Fig. 4 shows the same mold parts as are shown in Fig. 3 but with a set of segments 23 in place. The keystone shaped risers 21 of the segments are seated in the pockets 27 of the mold body, the pins 28 in the base of the mold extending upwardly through the holes 17 of the segments. It will be seen that the segments 23, when placed in the mold parts as shown in Fig. 4, are securely held and accurately spaced apart so that the core of insulation may be molded within the cylindrical row and made to extend between contiguous segments clear out to the outer diameter of the commutator.

With the segments 23 placed in the mold body 26 as shown in Fig. 4, a stock ring 32 is securely fastened to the body 26 by the screws 33. The risers 21 of the segments are fully as thick as the depth of the pockets 27 whereby the stock ring when bolted in place securely clamps the risers and prevents even slight movement of the segments either axially, radially or circumferentially.

The mold and segments are now preferably brought to a relatively high temperature and while they are so heated a charge 34 of unmolded insulation is placed into the stock ring 32. The plunger 35 is then entered in the upper end of the stock ring 32 as shown in Fig. 5. After the insulation 34 has absorbed sufficient heat from the mold to become plastic, the plunger 35 is

pressed downward, forcing the insulation about the plug **30** of the mold, and about the anchors **16** and **19** of the segments, and into all the space between adjacent segments to the outer diameter of the commutator. The insulating core is now hardened and the commutator removed from the mold. A completed commutator is shown in Fig. 7.

Conventional commutator molds usually comprise either no means at all for spacing the commutator segments, in which case mica strips are assembled between the segments and a core molded within the assembly, or the molds may have metal spacing strips extending radially inward from the inner wall of the mold, in which case the completed commutator has air spaces only between the segments. A mold comprising means for holding a series of separate segments spaced apart and yet leave the space between them vacant so that the insulation core may extend between them is therefore broadly new, and with this view of the invention

It is claimed:

1. For making commutators from a series of separate segments each of which has an outwardly turned riser at the one end and an inwardly turned anchor at the other end, a mold comprising a hollow body in the form of a cup having a smooth interior equal to the diameter of the commutator to be made, means on the upper edge of said cup for engaging said risers and means in the bottom of the cup for engaging said anchors, both said engaging means holding said segments against radially inward movement in circumferentially spaced apart relation around the periphery of the interior of the cup to compose of said segments a hollow cylinder having the spaces between adjacent segments entirely vacant, and means to mold a single mass of insulation into the said hollow cylinder and the said vacant spaces.

2. For making commutators from a series of separate segments each of which has an outwardly turned riser at the one end and an inwardly turned anchor at the other end, a mold comprising a hollow body in the form of a cup having a smooth interior of the diameter of the commutator to be made, the upper edge of said cup having a series of circumferentially spaced apart pockets each adapted to contain and closely fit one of said risers and the bottom of the cup having a series of circumferentialy spaced apart pins adapted to engage and hold the said anchors, said pockets and pins being so spaced as to hold the segments against radially inward movement in circumferentially spaced apart relation around the periphery of the interior of the said cup to compose of the segments a hollow cylinder having the spaces between adjacent segments entirely vacant, and means to mold a single mass of insulation into the said hollow cylinder and the said vacant spaces.

3. In a mold for making commutators from a series of individual segments having risers, a mold body having a cylindrical opening of the diameter of the commutator and a series of circumferentially spaced pockets to receive said risers extending radially from said opening, a bottom member for closing the lower end of said opening, means on said bottom member for holding the ends of the segments against circumferential and radially inward movement, and means to mold a core of insulation between and within said segments.

HERBERT F. APPLE,
EDWARD M. APPLE,
GOURLEY DARROCH,
Executors for Vincent G. Apple, Deceased.